

CHAPTER 45

REQUIREMENTS FOR TRAFFIC IMPACT STUDIES FOR DEVELOPMENT PROJECTS

The Department of Transportation is responsible, in a review/approval capacity, to assure that the provisions of the District's Zoning and Subdivision Regulations have been followed. In order to do this, the traffic impact studies may be required from the applicant to quantify impacts and identify facility improvements needed to maintain an acceptable level of service standards. The following presents, in general, when a traffic impact study will be required:

Preliminary Plan Stage – Normally, a full traffic impact study as detailed here in, will be required with all land use zoning and rezoning requests initiated with the preliminary plan. The requirement to prepare a full Traffic Study may be waived only if all of the following conditions are met:

- Daily trip generation is less than 300 vehicles.
 - No more than 250 vehicles per day access an existing collector or local road.
- Subsequent to the Preliminary Plan Stage - The following are the three scenarios that will require the preparation of an update (or amendment) to a previous study, or the preparation of an entirely new study that meets these guidelines:
- When traffic data is required, the applicant shall obtain the appropriate documentation from the Traffic Services Safety Division according to the following specific requirements:
 - When the original study was prepared during the preliminary plan process for a large, complex, or phased project and was designed, organized, and written to function as a “base” or master plan document for future Final Plan applications.
 - Where a traffic impact study was never prepared and the site fails to meet the conditions of a waiver outlined above, a new study is required.

45.1 Responsibilities of Traffic Impact Studies

The responsibility for assessing the traffic impacts associated with a proposed land use action rests with the landowner or land development case applicant, with the District Department of Transportation serving in a review capacity. The assessment of these impacts shall be within a traffic impact study as specified herein, prepared under the supervision of a Registered Professional Engineer in the District of Columbia with adequate experience in transportation planning/engineering. For the purpose of these guidelines, when the word “applicant” is used, it shall mean the applicant and/or his or her designated agent responsible for preparing the Traffic Impact Analysis. Requirements of a Study will generally consist of the following evaluations:

- Generalized peak hour traffic volume level of service
- Peak hour intersection level of service

- Appropriateness of access locations
- Potential need for future traffic signals
- Location and requirements of turn lane or acceleration/deceleration lanes
- Turn lane storage recommendations include tapers, storage, deceleration length, and other geometric design requirements.
- Sight distance evaluations and recommendations (intersection, stopping, passing)
- Multi-modal and TDM opportunities
- Pedestrian/bike requirements and/or improvements
- Recommended traffic control devices for intersections may include two- way stops, four-way stops or yield signs, school flashers, school crossing guards, crosswalks, traffic signals and roundabouts.
- Signal and 4 way stop warrants
- Link Volumes for all Major Streets (Average Weekday Traffic – AWT)
- Sign Changes
- Safety and Accident Analysis
- Turns in and out of driveways located within 150 ft. of intersections - The number of vehicles entering and exiting driveways usually are not part of the intersection analysis. If a driveway is placed too close to an intersection, motorists can block a turning lane on the approach to an intersection, and vehicles passing through an intersection wanting to make a left turn just past the intersection often block a crosswalk and cause traffic to back into an intersection. In the Traffic Safety Intersection Design Workshop, this driveway issue concerning the counting of vehicles was repeated as a major item often overlooked that causes actual and/or near miss crashes near or at the intersection.

45.2 Traffic Impact Study Overview: Requirements, Meetings and Waivers.

Should it be determined that a Traffic Impact Analysis is required, the information described above is required to be submitted to the District. The requirements for conducting a traffic impact study will be an important agenda item to be discussed at the pre-submittal meeting. The applicant is highly encouraged to bring a copy of the previous TIS prepared for the site, if any, and prepare and present a sketch plan showing:

- The location of the site
- Proposed access and its relationship to adjacent properties and their existing/proposed access
- Preliminary estimates of the site's trip generation at build-out (average daily traffic and peak hour traffic)

This information will assist in determining the level of detail and extent to which the TIS will need to address each of the following:

- The study area for the impact analysis

- The intersections to be studied in detail
- The distribution of trips from the proposed development
- Background traffic volume forecasts
- The need for special analysis

The District Department of Transportation will complete a summary of decisions made at the meeting. A copy will be given to the applicant. If the applicant requires clarification to the guidelines, or is preparing a larger complex or phased project, a separate meeting the Department of Transportation is encouraged to discuss appropriate requirements and strategies.

45.3 Planning Horizons and Roadway Network Assumptions

Each traffic impact study shall present an analysis of the traffic conditions without and with the proposed project at two planning years horizons: short term and long term. The intent of the first planning horizon is to investigate the immediate impact of the proposed project on the short-term roadway network. The short-term horizon year is defined as one year after occupancy of the project. If the project is proposed to occur over multiple phases, each phase shall be evaluated one year after phase occupancy.

The second planning horizon shall be based on the 20-year planning horizon. The intent of the second planning horizon is to evaluate implications of the proposed project on the long-range traffic condition.

The baseline surface transportation network (without the proposed project improvements) assumed for the first planning horizon should reflect existing facilities plus any firmly committed improvements by the District and other developments within the study area. All planned surface transportation facilities within the study area may be included for the baseline assumptions for the long term planning horizon network analysis.

Each planning horizon analysis shall identify the required facilities needed to bring the Level of Service (LOS) of the affected facilities up to District of Columbia established standards. If the established standards are currently exceeded, the study needs to:

- Identify what improvements are necessary to reach established standards
- What portion of those improvements are caused by the project
- What improvements are needed to offset project impacts

The ultimate network will identify the on-site roadways, site-adjacent improvements, and potential off-site improvements required and proposed by the project.

45.4 Traffic Impact Report Requirements and Format

The information contained in this section is required in all traffic impact studies submitted to the District of Columbia. It is incumbent on the applicant to have all of the required data and information clearly identified in the appropriate sections of the report. It is very important that the information contained in the Summary and the Appendix is accurate and complete in every way. Text contained in the required chapter shall be comprehensive and complete, yet be kept brief and to the point. All maps required in individual sections shall be placed in the Summary as well.

The Traffic Impact Analysis report shall be typed and bound. It shall contain a table of contents, lists of figures and tables, and indicate if there are any map pockets. The following outline shall be used for all Traffic Impact Analysis Reports submitted to the District:

1.) Summary

The first section of the report will be the Summary. Maps and tables required or provided in individual sections the report shall be placed in the Summary in the Order described and provided in the text of the report. Individual sections of the report may be referenced only as necessary to document a source of information. The Summary shall be provided as a condensed, stand alone document.

2.) Introduction

A.) Project Overview

The project overview section is to answer the question of why a traffic analysis is required for the proposed project, and to describe the approval request. The overview section shall also contain a discussion of the horizon years.

B.) Site Location and Study Area Boundaries

Provide a vicinity map that shows the site, the study area, and the surrounding surface transportation network. A brief description of the location of the site within the District and the region shall be included. The limits of the study should be based on the size and extent of the proposed development, and an understanding of the existing and future land use and traffic conditions at and around the site. The reasons the study area was selected shall be described in the traffic study in sufficient detail that the reviewer and decision-maker can understand the reasoning.

At a minimum, the study area shall contain:

- Adjacent and boundary streets and/or natural barriers
- Nearest arterial/arterial intersection(s)

- Access roads
- Internal roads
- All major signalized or potentially future signalized intersections, either current or future years, where:
 - the project contributes a 10 percent impact (during either the a.m. or p.m. peak hour) to any approach leg of the intersection where the intersection is operating at an acceptable level of service, or
 - the project contributes a 5 percent impact (during either the a.m. or p.m. peak hour) to any approach leg of the intersection where the intersection is operating at an unacceptable level of service.

C.) Description of Site

A brief description of the site shall be provided. This should include, as a minimum, a description of its size, general terrain features, existing zoning and use, and proposed zoning and use.

A map shall be included showing build-out conditions of the subject property of the following:

- The street system
- Roadway classifications
- Number of travel lanes
- Street width
- Existing and proposed ROW dimensions, and
- Existing and proposed driveways and accesses (with turning movements).

Similar information for adjacent property shall be provided as well, if available, on the same map. The data presented in this report shall be identical in every respect to the site plan submitted for development approval.

For situations where a site plan does not exist, a prototypical site roadway and access system should be assumed for purposes of the study. Subsequent update will be necessary when a plan becomes available.

D.) Existing and Proposed Uses in Vicinity of the Site

The applicant shall identify existing and anticipated land uses in the general vicinity of the site in order to understand other influences to area traffic patterns. Specific attention should be paid to property adjacent to the site and any undeveloped land in the study area. A map shall be prepared for the project vicinity that graphically depicts the

location of approved or proposed developments. Developments within the project study area but in other jurisdictions shall also be identified on the map and documented.

E.) Existing and Committed Surface Transportation Network

The applicant shall prepare a map showing the “planned” surface transportation network for the short term and long term planning horizons. Committed/funded improvements by the District and previously approved developments shall be identified for the short term and long term planning horizon years. Source of funds shall also be identified.

The long-term improvements shall be those documented in the 6-year plan and any other long-term improvements.

The improvements (at either planning year) of other local jurisdictions, agencies, and developments within the study area shall be identified. The nature of their improvement projects, their extent, implementation schedule, and responsible party shall be identified.

3.) Existing Traffic Conditions

The applicant shall provide a description of the existing traffic conditions within the study area. A map shall be prepared, which presents a.m. and p.m. peak hour and daily traffic volumes. These volumes shall be no more than one year old and less if, the project is in a high growth area. The source of existing traffic volume information should be explicitly stated. Summaries of current traffic counts shall be included in the appendix. A map of the existing roadway network shall be prepared that presents lane geometrics, traffic control, existing access, speed limits, and any other notable features.

Existing a.m. and p.m. peak hour intersection levels of service shall be determined for signalized and un-signalized intersections within the study area based on procedures described in the latest edition of the Highway Capacity Manual (or equivalent approved by DDOT). The existing arterials shall also be analyzed based on a daily volume/capacity ratio analysis where the threshold capacities are defined by arterial designation per the following table. Volume/capacity ratios that exceed 1.00 shall be identified. It should be noted that these are general thresholds for planning purposes only, and a supplementary peak hour analysis should be considered. These daily volume/capacity ratios shall be recorded on the existing volume map.

Facility Type	Lanes	Threshold Capacity
Local Residential	2	1,500
Local Non-Residential	2	2,500

Minor Collector	2	10,000
Major Collector/Minor Art.	4	20,000
Major Arterial	4	30,000
Major Arterial	6	45,000

4.) Future Traffic Conditions Without Proposed Development

Long term a.m. and p.m. peak hour planning horizon traffic forecasts shall be based on the most recent Council of Government (COG) traffic forecasts. Long-term peak hour estimates shall be provided in sufficient detail to understand the recommended forecasts. Requests for forecast shall comply with current COG protocol. It should be noted that the COG forecasts are based on future year population and employment projections that reflect a regional perspective on growth and development. The applicant and consultant shall investigate those land use assumptions as they apply to their project study area and make forecast adjustments as necessary.

The applicant shall develop a short and long term planning horizon traffic forecast. The short term planning horizon is one year after project occupancy. The short term planning horizon traffic forecast shall be the sum of existing traffic volumes plus cumulative development traffic plus ambient growth. The cumulative development traffic shall be based, in part, on the approved project's a.m. and p.m. peak hour and ADT summary sheets. The short term planning horizon traffic forecasts should also include cumulative development traffic from other jurisdictions within the study area. The short term planning horizon year ambient growth rate traffic forecasts shall be based on:

- proportion between existing traffic volumes and build-out regional model forecasts
- extrapolation from historical traffic counts to current counts, and/or
- planning analysis that considers trends in the areas circulation system through either a proportion of extrapolation estimate.

Whatever method is used to develop the annual growth rate for determining ambient traffic, it is important that the method be documented with sufficient detail to replicate the findings.

The map of the committed and funded improvements (for each planning horizon) shall be used as a based for determining short term and long term planning horizon levels of service. The applicant may identify improvements would mitigate unacceptable levels of service under the traffic conditions (without the proposed project). In addition to what improvements are needed, it is also important to identify when these improvements are needed. The time when improvements are necessary could be defined by when a traffic threshold is reached, or by year.

5.) Proposed Project Traffic

Project traffic will be developed based on the traditional trip generation, distribution, and assignment process described as follows.

A.) Trip Generation

The applicant shall complete the “Traffic Generation Summary Sheet” listing each type of land use within the site at build-out, the size involved, the average trip generation rates used (total daily traffic and a.m./p.m. peaks), and the resultant total trips generated. Build-out land uses and generation shall be for both the short term and long term planning horizons. If, however, the land use action is of a type that build-out in the short-term is not feasible due to the size of development, interim phases, such as 2-year increments, shall be developed.

Trip generation must be calculated from the latest data contained within the Institute of Transportation Engineers’ Trip Generation report or other industry publications such as the ITE Journal. Data limitations, data age, choice of peak hour or adjacent street traffic, choice of independent variable and choice of average rate versus statistical significant modification shall be presented and discussed. In the event that data is not available for a proposed land use, the applicant must conduct a local trip generation study following procedures prescribed in the ITE Trip Generation manual and provide sufficient justification for the proposed generation rate. This rate must be acceptable to the District Department of Transportation.

For studies submitted with preliminary development plans, trip generation shall be based on the maximum dwelling units permitted and/or the maximum trip generating, non-resident development allowed for the proposed project. With a final development plan action, trip generation shall be based on actual dwelling unit counts and square footage indicated in the final plan.

Shopping center trip generation algorithms may be used for mixed used developments. Because there are extreme variations in the trip generation characteristics of shopping centers, a trip budget or maximum trip generation allocation may be assigned to the project, based on the reports recommendation. Therefore, a conservative estimate is recommended.

B.) Adjustments to Trip Generation Rates

After first generating trips at full ITE rates, trip-making reduction factors may be used. These factors fall into two categories: those that

reassign some portion of generated trips to the background stream of traffic, and those that “remove” or “move” generated trips. In all cases, the underlying assumptions of the ITE Trip Generation rates must be recognized and considered before any reductions are claimed.

The first category is when trips to the proposed development currently exist as part of the background traffic stream, referred to as a pass-by trip. Pass-by percentages identified in the ITE Trip Generation manual or other industry publications may be used.

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This traffic must continue to be assigned to site driveways and access points, but is not added to the background stream of traffic. A technical appendix that illustrates the re-division of pass-by trips is recommended.

The second category for adjustments is for internal site trips, transit use, and TDM (transportation demand management) actions. In general, reductions are not recommended. However, if reductions are claimed, analytic support to show how the figures were derived must be provided. Optimistic assumptions regarding transit use and TDM actions will not be acceptable unless accompanied by specific implementation proposal that will become a condition of approval. Such implementation proposals must have a reasonable expectation of realization within a 5-year period after project initiation.

C.) Trip Generation Budget

Major concern has been raised when the traffic study identifies a trip generation rate that is less than what ultimately is experienced once the development is built and occupied. Because entitlement has been granted, the impacts of the traffic from underestimating the trip generation is experienced by the community and modifications of improvements, if possible, become the burden of the public. It is recognized that the trip generation process is ultimately dependent on a number of market and social factors; however, it is imperative that the traffic impact study be sufficiently conservative to account for full impact of the proposed development.

To assure the public and the District that the traffic impact analysis adequately addresses the full impact of the development, the trip generation of the proposed development will establish the maximum

amount of trips permitted from the development. If a future traffic impact is experienced that was not addressed in the traffic study, and it is determined that it is due in part to a project's trip generation exceeding the trip generation assumed in the traffic study, the District will require the development to either:

- Make additional improvements to reduce the project traffic volumes to the amount estimated in the traffic study.
- Provide additional mitigations to the project traffic. This requirement will become a condition of all development approvals requiring a traffic study.

Two specific situations will be closely reviewed. The first is when the traffic study assumes rates where the collection of mixed uses, such as at a shopping center, result in lower peak hour trips than when applying individual rates to each land use. The second is when reductions in the trip generation rates are assumed based on reductions due to travel demand management.

If the trip budget is reached prior to full occupancy, the District reserves the right to request supplemental traffic analyses and/or additional mitigations prior to granting full occupancy permits. If the project is fully occupied and it is determined that the development traffic exceeds that which was included in the traffic study, then the property owner may be requested to conduct additional traffic analysis and provide additional mitigation.

D.) Trip Distribution

Trip distribution may be based on COG traffic forecasts, market analysis, existing traffic flows, applied census data, and professional judgment. Regardless of the estimates, the procedures and logic for estimating the trip distributions must be well documented. The trip distribution patterns must be presented for each phase if changes in roadway network, access or land use are proposed. The distribution percentages shall be noted on the Summary of the Traffic Impact Study (TIS) report.

E.) Project Trip Assignment

This section shall present the forecast project traffic assignment based on the project's trip generation estimates and project trip distribution. The traffic forecasts shall be graphically presented and include: a.m. peak hour, p.m. peak hour, and total daily site-generated traffic. If trip generation is different for the short term and long term planning

horizons, both should be shown on separate graphics. “Pass-by” traffic should be included at driveways and access points.

6.) Future Traffic Forecasts With the Proposed Development

The applicant shall present a graphical summary of the short term and long term horizon year traffic plus the proposed project traffic for the a.m. peak hour, p.m. peak hour, and daily conditions. These volumes shall include turning movements at the key intersections. The base map for this exhibit shall reflect the respective transportation network by planning horizons.

A.) Project Impacts - The key elements of the project impact analysis include:

- generalized daily traffic volume level of service
- a peak hour intersection level of service
- the appropriateness of access locations and the need for future traffic signals
- turn lane storage requirements
- sight distance
- appropriateness of acceleration or deceleration lanes

The requirements for these six evaluations are as follows:

1.) Generalized Daily Traffic Volume Level of Service

Using the daily traffic volumes forecast and general daily level of service thresholds, a general evaluation should be made of the arterial street system for the short and long term horizon years. Incremental differences attributable to the land use action should be identified. A map showing generalized levels of service should be presented for each design year.

2.) Peak Hour Intersection Level of Service

An a.m. and p.m. peak hour intersection level of service analysis shall be conducted for each intersection, based on procedures specified in the most recent release of the **Highway Capacity Manual** (or an approved method by DDOT). The “planning method” of analysis is permitted. All level of service analysis worksheets shall be included in the appendix. The principal objective of the intersection level of service traffic impact analysis is to identify whether the traffic from the proposed project when added to the existing plus short and long term planning horizon traffic will result in a significant impact and an unacceptable level of service. Significance is defined as:

- When the added project traffic causes the level of service to exceed the established threshold

- When the short term or long term horizon year traffic with the project exceeds the established threshold, and the project traffic causes a 2 percent increase in the volume/capacity ration or delay.

3.) Traffic Signals and Access Locations

The appropriateness of the project's access locations and type must be established. For full-access locations, a signal warrant analysis based on the **Manual on Uniform Traffic Control Devices** must be conducted for each design year. Traffic signals specifically warranted by the land use action shall be identified.

The acceptability of the signal locations must be demonstrated through a signal progression (time-space) analysis. The analysis shall consider any existing access or intersection or a possible future signal location along the arterial for a distance of at least one mile in each direction of the proposed signal. A cycle length of between 80 and 120 seconds should be selected and agreed to by District staff. A travel speed of 45 Mph on majors and 35 Mph on minors, unless the existing posted speed limit is less, must be used. A major arterial bandwidth of 50 percent and minor arterial bandwidth of 40 percent are considered desirable, and must be used where existing conditions allow. Where intersections or other accesses have no signals presently, but are expected to have signals, a 60 percent mainline, 40 percent cross street cycle split should be assumed. Where information that is more detailed is available from turning movement projections, other split assumptions may be made.

Any access that would reduce the desirable bandwidth if a traffic signal were installed shall be identified. In general terms, that access should remain un-signalized and have turning movements limited by driveway design or median islands, unless the impacts to traffic operation and safety are made even worse by doing so. The implications of the land use action upon the adequacy of the signalized locations for each design year shall be provided. Distances between signalize intersection (centerline) shall be indicated.

4.) Turn Lane Storage Requirements

Turn lane storage needs shall be identified for the necessary situation, based on projected turning volumes and **AASHTO**

analytic techniques. Appropriate documentation of the calculations must be provided.

5.) Sight Distance

The identification of project sight distance at the project entrances and all internal streets shall be conducted. Line of sight triangles for determining sight distances and landscape restrictions shall be drawn on the site plan.

6.) Appropriateness of Acceleration or Deceleration Lanes

All proposed project entrances on arterials shall be evaluated as to whether they require acceleration lanes or deceleration lanes.

7.) Special Analysis/Issues

This section provides the District with opportunities to request specific focused traffic analyses germane to the proposed development. These could include access control, access spacing, accident/safety concerns, cut through traffic and residential quality of life, truck estimates and pavement design, accident statistics, pedestrian safety, bicycle safety, safe routes to schools, emergency routes, etc. This section would also contain environmental and regional air quality conformity analysis as necessary.

8.) Mitigation Measures/Recommendations

This section shall describe the location, nature, and extent of all transportation improvements that the applicant recommends to yield to reasonable operating conditions in each horizon year with the land use action approved as requested. For this discussion, the following terms apply:

A.) Planned

Improvements planned have committed funding including those identified in short term capital improvement programs by District agencies.

B.) Background Committed

Improvements committed to by previously approved development.

C.) Applicant Committed

There are two conditions where improvements need to be identified:

- When existing plus cumulative traffic with planned and background improvements exceed established levels of service, the applicant shall identify mitigation to offset project impacts.
- When existing plus cumulative traffic with planned and background improvements do not exceed established levels of service, the applicant shall identify mitigation to achieve established levels of service.

D.) Necessary

Improvements required to mitigate background plus applicant traffic to established levels-of-service, the applicant shall identify mitigation to achieve established levels-of-service.

The reason that “necessary” improvements must be explored is that often the “background committed” or “planned” improvements plus the improvements that the applicant typically understands and commits to are not adequate to provide the established level of service. The applicant should assure that all practical solutions have been considered when developing the list of “necessary” improvements, so that the resulting operating conditions are made to approach the established level-of-service.

For purposed of identifying improvement possibilities (either by the applicant or by the District) “necessary” to yield an acceptable level of service, the cost of the improvements shall be considered a limiting constraint with the context of the traffic impact study. However, the goal of the evaluation is to identify cost-effective solutions that yield a reasonable level of service. Extremely high-cost solutions may not be cost-effective, but it is important to at least identify solutions so that decision makers are cognizant of existing options.

The applicant shall use a “Recommended Improvements summary Sheet” to present the recommendations. One sheet may be used for both design years if all the improvements can be conveniently described thereon. If not, one or more sheets should be completed for each design year.

All recommended improvements should be identified on the Summary sheet, including “planned,” “background committed,” “applicant committed,” and “necessary.” Each project shall be briefly described as to its location, the type of project, flow line and ROW needs (for roadways), signal or turn lane improvements (for intersections), and, at a sketch planning level, cost of the improvement. In addition, commitment to the improvement shall be identified either by governments, or by the applicant himself (this may included both the

“applicant committed” and “necessary” projects). Identification of a project as “not currently committed” may be an appropriate description for many needed projects, including some of those that are “planned.” However, the goal of the recommendations should be to identify a firm program of improvements that will support the proposed land use action and background traffic in each design year.

It is further required that all geometric improvements such as pavement markings, signs, adding through or turn lanes, adding project access and assorted turn lanes, acceleration lanes, and changes in medians, shall be presented in scaled drawing, preferably on a current aerial map. Sufficient dimensions shall be identified to facilitate review. ROW needs shall also be identified on the plan.